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ABSTRACT

A segment of a longitudinal study of the changing management philosophy of a public school organization involves the introduction of a new technology--the use of an integrated information system--in an environment that was to have been prepared for change. The administrators and staff of the organization had participated in a feasibility study that was developed and conducted to prepare the subsets of the organization for the change. The purpose and objective of the study was to review all the operational systems of the school district and to evaluate the feasibility of utilizing computer capability to improve the efficiency and effectiveness of these operational systems. Background material is presented, then the observations of actions and reactions of individuals and groups of individuals are reviewed. At the conclusion of the paper there is a summary of reactions and an evaluation of interpersonal relations. (Author/MLF)

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Introducing A Technological Change In A Public School Organization[1]

A. E. Wolfe

This project took as subject matter a segment of a longitudinal study of the changing management philosophy of a public school organization. This particular segment examined the introduction of a new technology in an environment that was to have been prepared for change. The new technology is the use of an integrated information system of a unique nature; the administrators and staff of the organization had participated in a feasibility study which was purposely developed and conducted to prepare the subsets of the organization for a change of significant magnitude. The time span of this particular project covers the period of implementation of the new information system which began July 1, 1975 and continues at the present time. To understand the dynamics of the situation it is necessary to give considerable space in this paper to background material in order to set the scenario, then the observations of actions and reactions of individuals and groups of individuals will be reviewed. Finally at the conclusion of this paper, there is a summary of reactions and an evaluation of interpersonal relations by the writer. This project stands by itself, but if read in the context of the longitudinal study being done as a dissertation effort, it may have more meaning.

It was considered desirable to involve the entire administrative staff in the feasibility study, for it is they who would be responsible for the implementation and operational success of the redesigned system. The purpose and objective of the study was to

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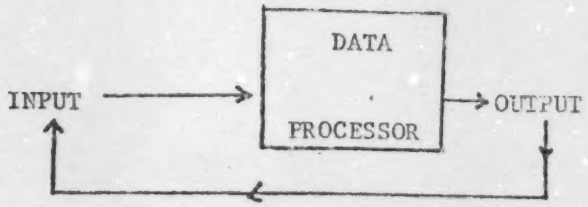
review all of the operational systems of the school district and to evaluate the feasibility of utilizing computer capability to improve the efficiency and effectiveness of these operational systems. The administrative staff of the school district was capable of reviewing, studying and evaluating the present and also the required systems necessary to improve the decision making process. There existed on the staff competent resources to relate to current computer capabilities, but the resource did not exist to interface directly with the computer.

In order to achieve a common understanding of the problem and to communicate the intent and direction of the study, a two and one half day workshop was held. This workshop provided an opportunity for the school district administrators to become more familiar with the concept of a data base information system. The effort was directed toward developing AIDS - Administrative Information Data Base System. The data base concept was expressed in terms of a library of data. By carefully stacking individual bits of data in a highly structured manner, a whole library of data becomes available. When a particular bit of data or combinations of these bits of data are required, retrieval is possible in such a way that meaningful answers result. This meaningful retrieval is contrasted with the production of multitudes of non-digestible reports. Helpful information is provided to the administrator from the bank (library) of data, which enables the administrator to make more beneficial decisions. The importance of the input/output relationship was stressed. In order to provide good output information, it is absolutely necessary to provide good input data to the information system; e. g.



as illustrated, processed input data provides output which in turn allows for additional input for recycling and reprocessing. The validity of output information is constrained by the accuracy of the input data; therefore a zero defects effort was stressed.

Initially the efforts of the Project Team were directed toward:

> Identifying the functions of the school district to be reviewed during the course of the Feasibility Study.
>
> Specifying the parameters of the functions identified above to assure coverage of the entire systems network of the district and to prevent overlap of work by appointed sub-project teams.
>
> Organizing sub-project teams and establishing time frames for completion of the study of each identified function.

In support of the first objective, the following seven specific functions were identified:

> Account Code Structure
>
> Personnel
>
> Maintenance
>
> Accounting Systems
>
> Curriculum, Research and Development
>
> Transportation of Pupils
>
> Inventory Systems

Once the functions and systems to be studied were defined and sub-project teams were organized to conduct the studies, it was necessary to coordinate effort in order to avoid duplication and to assure full coverage. Throughout the five months of study (the first month of

the study was devoted to organizing) the sub-project teams met regularly and enjoyed full and active participation of the administrators. At regularly scheduled intervals the Project Team met and shared the effort and evaluations of each sub-project team.

Written reports were prepared for each meeting of the sub-project teams and copies of these reports were disseminated to all members. Each sub-project team member reported the efforts of his team at Project Team meetings. Minutes were kept of each Project Team meeting and reports of each meeting were disseminated to each member of the Project Team, the School District Superintendent, the Assistants, the Director of RISE, and Dr. John Buzby, Assistant Executive Director of the Intermediate Unit.

Throughout their studies each sub-project team remained cognizant of the scope of the Feasibility Study. All of the operational systems of the Colonial School District involving staff and students were included in the study. The present method of accomplishing each function was subject to evaluation and whether or not it should be adapted to automation. When a current operational system was determined to be effective and efficient, it was to be maintained. If it could be improved by adapting to the use of the computer, this should be done. However when the current system can be improved by a totally different system, a change should be recommended. The Feasibility Study was not merely to adapt current systems to automation, but to evaluate current systems and to improve them where possible by the use of a total information system. The concept of the total information system is predicated on the development of a carefully structured and

maintained bank of data and the retrieval capability that allows for improved decision making by administrators.

This improved decision making is a result of better information being available on a more timely basis, thus the entire administrative process becomes action oriented and future events can be planned versus being reactive and responsive to events which have already taken place.

Very early in the deliberations of the Project Team it was agreed that a total information system was desirable. The type questions being asked by administrators without adequate answers, the costliness of providing individual and separate bookkeeping systems to account for expenditures, and the lack of data concerning relationships of student performance at all grade levels make the desirability of a total information system very clear. As current systems were studied and evaluated, more correct answers and more beneficial suggestions for change evolved. The other question remaining concerned the possibility of technical development of a total information system. That question was addressed by the TRILOG organization who have developed a viable and economical total information system.

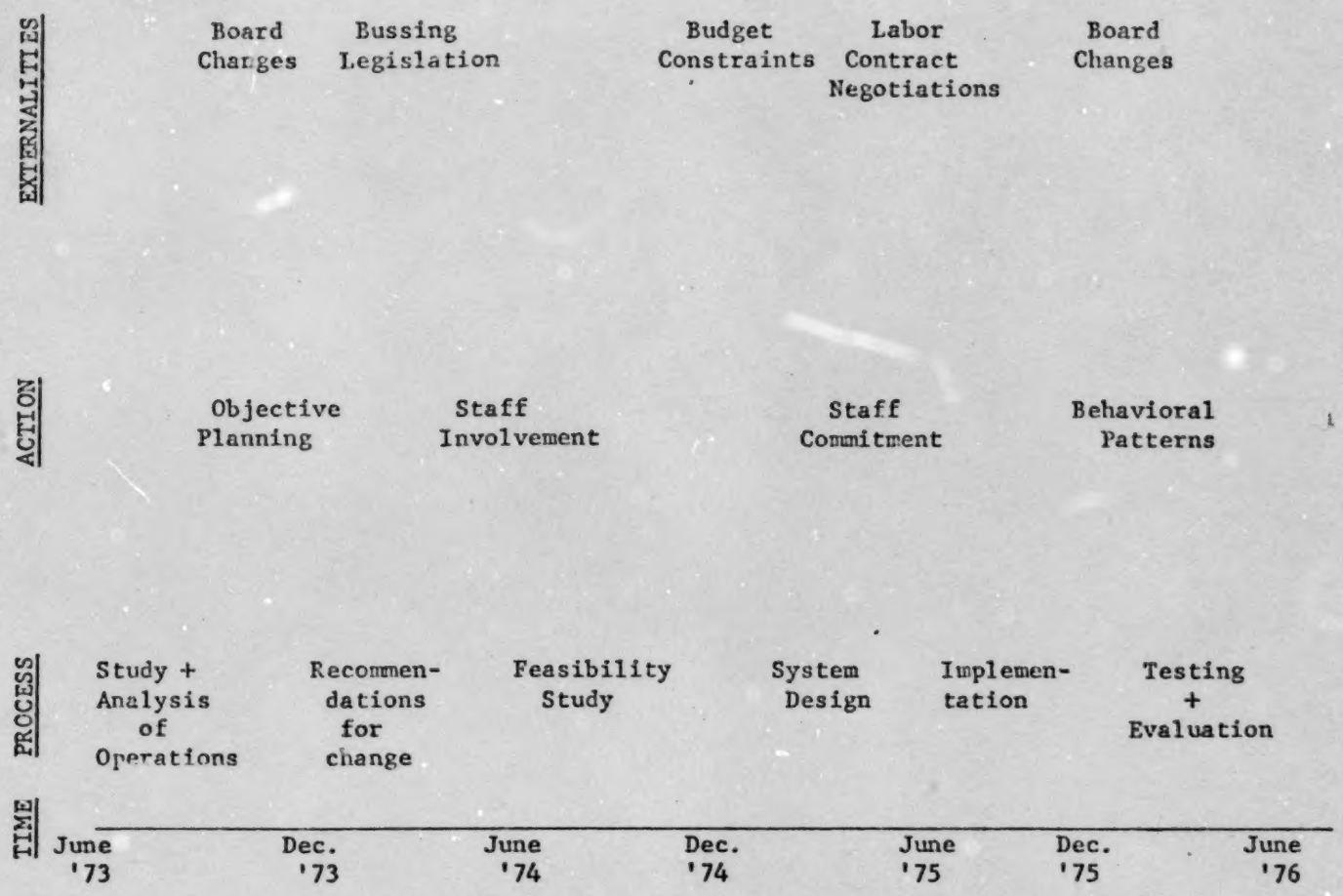
A system can be defined broadly and crudely as any entity, conceptual or physical, which consists of interdependent parts. Also systems research is only concerned with behavioral systems which are subject to control by human beings. The essential characteristic of a behavioral system is that it consists of parts each of which displays behavior. It is the behavior of individuals taking part in this systemic

study within the framework of a specific organization that is of interest here, however before examining the behavioral aspect, additional understanding of the organization and the environment are needed. An organization can be defined as an at least partially self controlled system which has four essential characteristics:

- some of its components are human beings
- responsibility for choices from the sets of possible acts of any specific situation is divided among two or more individuals or groups of individuals
- the functionally distinct subgroups are aware of each other's behavior either through communication or observation
- the system has some freedom of choice of both means (courses of action) and ends (desired outcomes)

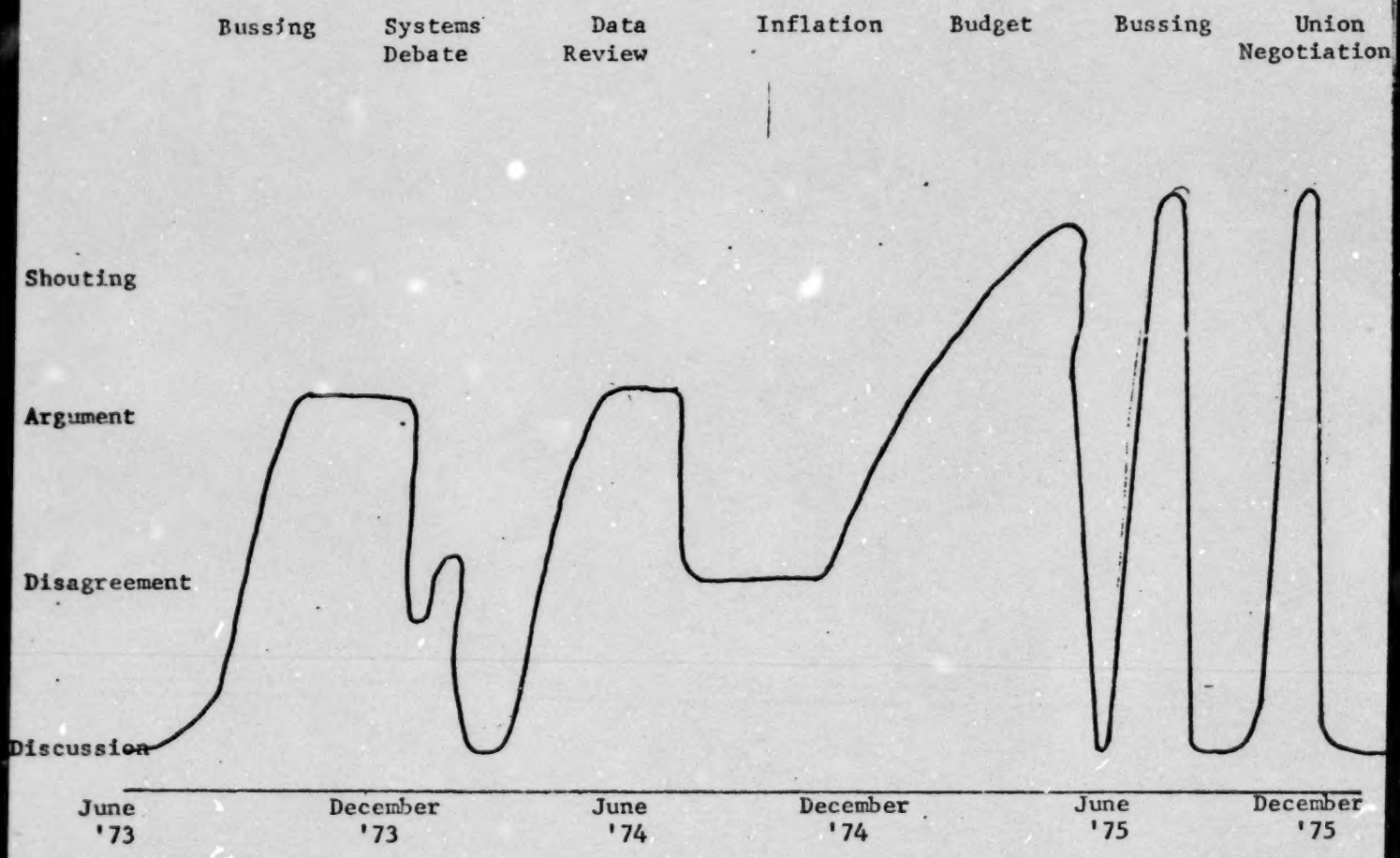
The four essential characteristics of an organization, then, can be briefly identified as its content, structure, communications, and decision-making (choice) procedures (Ackoff, 1960).

The following chart plots the time span of the longitudinal study and indicates the progression of the change procedure (process), the change action, and the externalities impacting on the organization. It is helpful to have this scenario in order to understand and evaluate the behavioral reactions of individuals and groups within the organization. One should recognize the pattern of development for two years prior to the period of implementation considered in this particular project paper. Of particular significance are the externalities, for certain dysfunctions during the implementation period seemed very confusing until analyzed in the context of the externalities impacting on the organization.



The significance of the externalities which represents changes in the environment in which the public school system exists is stressed. In a companion term paper a position is taken that public school organizations can function as open socio-technical systems and the particular organization being studied is striving to operate in that manner. Therefore the interaction of the organization with the environment is a critical and essential part of this fresh approach to administration of the organization. For this purpose then, the externalities have a very significant impact on the members of the organization. Since an open system is conceptualized as an organism

with negentropy the following chart is designed to indicate the degree of dysfunction (the externality) which may be compared with a measurement of blood pressure indicating reaction of the organism to a departure from norm.



The design, development and implementation of an integrated information system for an organization is a complicated process and it is necessary for at least three groups to collaborate, namely information systems specialists, management scientists, and administrators. In an important alteration of an organization's information system there also probably should be present staff specialists of different types in the areas involved. The approach to more integrated information systems will fail unless all these groups participate and seek a realistic understanding of how decisions are made in an organization, the different types of decisions that are made, the information requirements to make the decisions, and the preferred means to get the required information to the right administrators (Ackoff, 1967). This is the approach taken in this instance with a commercial information systems specialist firm, the writer as the management specialist and the cadre of school administrators and selected staff members conducting a feasibility study to explore the decision-making process and criteria in the organization. The reactions of the management specialist (the writer) would be biased, but the following comments are taken from the information systems specialists report:

SECTION I: MANAGEMENT SUMMARY

Presented herein is an analysis of the COLONIAL SCHOOL DISTRICT'S data processing feasibility study.

This study was performed by the District's administrators, with technical assistance and advice provided by TRILOG Associates, Inc.

Section II of this report states TRILOG'S understanding of the background and desired results of the study.

Section III details our analysis of the major sub-systems that were studied with recommendations as to how computer technology can be used more effectively than is now the case.

The summary in Section IV states the general characteristics of an integrated system which will accomplish the requirements and incorporate the detailed recommendations discussed in Section III. Emphasis is also given to the need for careful planning and TRILOG'S suggestion for possible implementation steps.

In TRILOG'S opinion, the study was a success in that its goals of administrator involvement and enumeration of information processing requirements were achieved. The results of the study (pointing out the need for more administrative decision making information) have more than justified its existence.

SECTION IV: SUMMARY

Improvements Can Be Achieved

Techniques for organizing and processing data can make important contributions to improving management effectiveness and reducing operating costs. The principle concept which contributes to achieving these benefits is the idea of the central unified data base.

Three principal data bases and a number of subordinated data bases are necessary to serve the School District's requirements. The three principal data bases are (1) pupil/personnel, (2) employee personnel, and (3) financial information. The subsidiary data bases consist of inventory, vendor, equipment maintenance and several files which contain supporting data.

Systems are developed to capture data as effectively as possible. Ideally, data is captured as soon as it is first available, and before it is manually processed to any great extent. Data is immediately validated thoroughly and careful attention is paid to proper error correction. Once captured, the data is applied to the data base and is then available for use by all areas requiring that element. The several data bases and their supporting systems are integrated to make this most effective.

Planning Is Essential

The "big picture" must be clear in advance. We must know the essential factors about each data base and system and generally how they will interact before any module is finalized. In this context "system" means much more than the collection of computer programs which will run. It includes all of the human interfaces both in data capture and in report utilization.

Normally, the data base, including its coding structure, is designed first in each area. This includes the development of specific coding structures such as the new Chart of Account Codes. Then the data capture/validate/error correction/data base update modules and the reporting modules are designed.

Then, the systems which work with each data base must be developed. Once again, they can be effectively developed and implemented in pieces. Only a manageable segment, both from the standpoint of the clerical staff, administrators and systems analysts, should be tackled in any one "bite".

Timing will be important. Each of the major data base systems can be developed separately. Usually one at a time is best for all concerned -- clerical staff, administrators, systems analysts.

A number of factors will influence how much and what should be undertaken at any one time. These factors include (1) the District's schedule or calendar, (2) the relative importance of various requirements, (3) the interdependence of various systems (some things must be done before others, and sometimes two or more parts must exist and work together), and (4) the availability of resources (is ther time to train those using the system, to build the data base, to write the programs?).

If one is to evaluate the reactions of individuals during the period of implementation with all of the trauma created by the change process and to seek to analyze the results for the organization, it may be well to look at the values derived. Values in this sense meaning outcome values - these include desired organizational ends, aims, goals, and objectives - these are consciously set by the organization and periodic measurements are taken to see how well the organization is achieving them. Values also are process values - these are the immediate satisfactions derived, by those associated with the organization from the activities of the organization.

Representative comments are as follows:

School Board President - "If all we ever get from the information system is the material used for contract negotiations, it is justified."

School Board Member - "The material presents information I've always wanted to help make decisions but could never get before."

School Board Treasurer - "The old system worked well for years, I don't see why we need to change now."

Superintendent of Schools - "All school districts throughout the country need a system like this."

Food Services Director - "I've been here for sixteen years and I have learned more about the school district in the past six months than in all the prior years."

Payroll Supervisor - "Getting to know what really goes on in the system was really enlightening, the work has been difficult, but rewarding."

Purchasing Supervisor - "Working out the details and solving the problems has been a real pain, but I guess the end results are worth it."

Bank Officer - "It is obvious from where we sit that some unusually fine things are happening in that organization."

State Auditor - "We have observed a very significant turn-around in the successful operation of the school district."

Secretary - "There is now an organization that almost operates by itself; we never had that before."

The unsolicited comments indicate satisfaction for most of the individuals and success for the achievement of goals of the new technology. Extensive questionnaires before the feasibility study will be related to questionnaires distributed in the next month, the results

of which will be reported in the longitudinal study dissertation. The outcome values and process values of the recent several months of implementation of the information system observed in this project seem realized and appreciated. Original fears and anxieties to the anticipated change seem to have been overcome; dysfunctions during implementation seem to have been more related to externalities than to internal organizational stress, and alienation of individuals to the changed work environment is minimal.